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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of: Roger P. Hoffman

For: **COMPOSITE PAPERBOARDS AND METHOD OF MAKING  
COMPOSITE PAPERBOARDS**

Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

Enclosed please find a Patent Application based on Application Number 60/122,556 which was filed on March 2, 1999 and continuation-in-part of Serial No. 08/579,219 filed December 28, 1995, check in the amount of \$456.00, Declaration, Small Entity, Assignment with a check in the amount of \$40.00, and a postcard. Please send back postcard and assign Serial Number and filing date.

Respectfully Submitted,

*Philip M. Weiss*

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Express Mail mailing label No.: E486330308US

Date of Deposit: March 1, 2000

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Date



03/01/00

**STATEMENT CLAIMING SMALL ENTITY STATUS  
(37 CFR 1.91(f) & 1.27(c))--SMALL BUSINESS CONCERN**

Docket Number (Optional)

P/2-61

Applicant, Patentee, or Identifier: Roger P. Hoffman

Application or Patent No.: \_\_\_\_\_

Filed or Issued: \_\_\_\_\_

Title: COMPOSITE FIBERBOARDS AND METHOD OF MAKING COMPOSITE FIBERBOARDS

I hereby state that I am:

- ☒ the owner of the small business concern identified below;  
☐ an official of the small business concern empowered to act on behalf of the concern identified below.

NAME OF SMALL BUSINESS CONCERN: The Hoffman Group, Ltd.

ADDRESS OF SMALL BUSINESS CONCERN: 125 South Jefferson Street, Suite 201  
Green Bay, Wisconsin 54301

I hereby state that the above identified small business concern qualifies as a small business concern as defined in 12 CFR Part 121 for purposes of paying reduced fees to the United States Patent and Trademark Office. Questions related to size standards for a small business concern may be directed to: Small Business Administration, Size Standards Staff, 409 Third Street, SW, Washington, DC 20418.

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- ☒ the specification filed herewith with title as listed above.  
☐ the application identified above.  
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☐ each such person, concern, or organization is listed below.

Separate statements are required from each named person, concern or organization having rights to the invention stating their status as small entities. (37 CFR 1.27)

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NAME OF PERSON SIGNING: Roger P. Hoffman

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SIGNATURE: [Signature] DATE: 2/25/00

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# COMPOSITE PAPERBOARDS AND METHOD OF MAKING COMPOSITE PAPERBOARDS

## CROSS REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of Serial No. 08/579,219 filed December 28, 1995, incorporated herein by reference.

## FIELD OF THE INVENTION

This invention relates to paper laminates and a method for preparing paper laminates, and more particularly to paper laminates used for disposable cups, disposable plates, book covers, folding cartons and beverage containers.

## BACKGROUND OF THE INVENTION

Paperboard is used every day to create products such as disposable picnic supplies, covers for paperback books, folding cartons and beverage carriers. In the paper industry, the term paperboard refers to heavy papers like board stock. Board stock is a subgroup of paperboard used to make paper cups and plates, hot and cold food containers, ice cream containers, paper back book covers and the like. Box board, a second subgroup of paperboard, is used to make folding cartons such as cereal boxes, beverage carriers, and tissue boxes.

The end use of a product made from paperboard dictates the type of paperboard used. Paperboard characteristics such as cushion, strength, stiffness, wear resistance, coefficient of friction, density, caliper, color, brightness and smoothness are generally considered. In applications where enhanced printed graphics on the product is critical, characteristics such as smoothness and brightness are most important.

Typically, when smoothness and brightness are the desired paperboard characteristics, a solid white paperboard is used. This white paperboard, commonly referred to as Solid Bleached Sulfate, is produced from bleached pulp and used for many of the aforementioned purposes. Though bleached paperboard characteristics contribute to improved printed images, it is considerably more costly to produce and lacks the strength of an unbleached paperboard, and does not provide an ideal surface on which to print high quality graphics.

Other paperboards are even less desirable for printing high quality graphics than Solid Bleached Sulfate paperboard. For instance, unbleached boards have surfaces that are relatively rough or uneven. Unless certain manufacturing processes like clay coating the paper surface or bleaching the pulp are employed, the paperboard surface normally has a gray or brown color. Printing directly on a dark color of the unbleached board provides poor visual contrast for the printed image. Thus, folding cartons used for protecting cosmetics, luxury items, or paperback covers often display a very high quality graphic image that requires use of a higher quality paperboard than has been bleached and/or clay coated.

The prior art discloses a laminated package used for beverage carriers. The prior art discloses a sheet or web of clay-coated or other publication paper that is printed with graphics and stored for subsequent application to a cellulosic substrate. The cellulosic substrate generally consists of one or more plies of unbleached virgin kraft pulp. At the paperboard converting manufacturing site, the coil printed paper is unwound and bonded to a surface of the moving cellulosic substrate with an adhesive to provide a laminated material used to make packages. However, since the thin layer of paper is relatively

translucent, the dark colored cellulosic substrate may show through the printed paper and detracted from the appearance of the graphics. To prevent "show-through", finely divided particles of generally inert white pigment, such as calcium carbonate or titanium dioxide are incorporated in the adhesive, or alternatively, a second clay coat is applied to the undersurface of the paper prior to bonding the paper to the substrate.

## SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a laminated composite sheet whereby it may be unnecessary to add a pigment to the adhesive layer or a coating to the publication grade paper adhesively attached to an unbleached cellulosic substrate. Another object of the invention is to provide a laminated structure where the base board is comprised of at least two-ply one of which is comprised of bleached cellulosic fibers for the purpose of providing a replacement for Solid Bleached Sulfate white paperboard and at least one other ply of unbleached fibers. A ply refers to a layer of cellulosic fiber which is bonded to at least one other layer of cellulosic fiber at the wet-end of the paper machine. Such plies are pressed together in the press section of the papermachine and are subsequently dried together, thus forming a single web of paper or board. One common example of such board is whitetop or mottled-white linerboards. These boards are used to make white corrugated containers. The corrugated container and related linerboard is a very separate and different industry from boxboard and paperboard products. Such differences makes it non-obvious and novel to use such boards for paperboard and boxboard applications. Yet another object of the invention is to provide a laminated composite sheet used to make products that will come in contact with moist, oily or odorous products. The adhesives used in the laminating can provide

an oil barrier to prevent such oils from degrading the quality of the printed carton. The adhesive oil barrier is a cost effective substitute to the requirement of an expensive coating operation that exists with the prior art to protect the printed image from oil migration.

A further object of the invention is to provide a laminated composite sheet that has a higher stiffness, tensile strength and tear strength than an unlaminated solid bleached cellulosic board of the same caliper.

One component of a laminated composite sheet is a two-ply base layer comprised of a bottom ply and a top ply. The base layer is formed on a papermaking machine having two wires wherein each ply is formed on a separate wire and conjoined. The top ply is comprised of cellulosic fibers such as bleached or brightened virgin pulp, either mechanically produced or chemically produced, which is provided by the first head box. The benefit of using mechanical pulp is its high opacity for minimizing show through of the darker bottom ply. The bottom ply is comprised of unbleached cellulosic fibers such as unbleached virgin kraft pulp or unbleached recycled pulp provided by the second head box. Because the plies are formed on the same papermaking machine, no adhesive is needed to bond the bottom ply and the top ply together.

In one aspect of the invention, a paper or film substrate is attached to the top ply with a layer of adhesive to form an interlaminated board. The paper substrate may be very thin, such as MG paper, since the top ply is relatively bright. This relative brightness of the top ply can make it unnecessary to add a pigment to the adhesive layer or coating to the top ply of the paper sheet to achieve the required brightness of the board. In addition

to MG paper, the paper sheet may be a publication or label paper or other printing and writing grades of paper.

Similarly a clear or pigmented film substrate, such as polyester, poly-ethylene or poly-propylene film can be added. This film can provide tear resistance, such as bi-oriented poly-propylene or polyester and may have pigments (such as clay or titanium dioxide) in it or pigments, in the adhesive used to secure the film to the board. These pigments can be used to increase the brightness of the surface. Because the outer ply of the board is bleached or brightened fibers, very little pigment in adhesive is necessary to obtain a very bright board surface. An example is a film attached by a white adhesive to a white board. This is contrary to the prior art, where films are secured to a board that is not bleached or does not have bright fibers. Even with significant pigment the required brightness cannot be achieved. Without these pigments, such laminated composite structures would be no brighter than the outerlayer of the board substrate, as the film is clear. The use of tear resistant film allows for a caliper and basis weight reduction in the packaging, further enhancing the logistics and economics of such embodiment. The film can also have properties that provide for the requisite coefficient of friction and gloss characteristic. The film can be reverse printed or forward printed.

Laminating a smooth and relatively thin grade paper to a rough surface would somewhat diminish the high quality image printed on the grade paper. Thus, the top ply of the board structure may also have an enhanced smoothness. In some instances, it may also be desirable that the paper sheet have an additional coating and/or supercalender to enhance smoothness.

In some applications, it may be desirable to include another layer of board, newsprint or other groundwood papers, or unbleached kraft paper on the interior. This additional laminated layer can provide many benefits including moisture absorption, additional tear strength and stiffness. Hereafter, such layer shall be referred to as a moisture-absorbent layer. The moisture-absorbent layer of paper or board attached to the unbleached bottom paper or board ply of the interlamine board using a layer of adhesive. This adhesive may be used as a barrier for moisture, oil and odor. The addition of such additional moisture-absorbent laminated board to the interlamine board enhances the stiffness and strength of the board. This board structure is herein referred to as interlamine B-board.

In another aspect of the invention, a laminated sheet has a pair of two-ply interlaminated boards, each having a first layer and a second layer comprised of a bottom ply and a top ply, the top ply having bleached or brightened fibers formed on the papermaking machine as previously described. An adhesive layer is disposed between the base unbleached layer so that the bottom unbleached plies of each interlamine board are adhered together, leaving the bleached or brightened top plies visible on each side of the composite board. The adhesive layer serving to bond the first and second layers together may also act as a barrier for moisture, oil or odor. Further, the top plies have an enhanced smoothness to allow printing directly thereon, or to enhance the smoothness and brightness, allowing the use of a relatively thin grade of paper selected from the group comprising coated and uncoated groundwood, and coated and uncoated free sheet grades, including lable grades. The paper may be laminated on either one or both of the visible bleached or brightened top plies. This board is referred to herein as dual



interlamine board, if it has a laminated paper on both of the top plies. If only one of the top plies has paper laminated to it, the composite board is referred to as the composi-interlamine board. If the board does not have any paper laminated to the top plies, it is referred to herein as composi-board. Film can be submitted for paper for the reasons indicated above in the discussion of the embodiment called interlamine board.

It is an object of the invention to provide a method for forming a laminated composite sheet comprising: preparing a top ply comprised of bleached or brightened cellulosic fibers. Preparing a bottom ply comprised of unbleached cellulosic fibers. The two plies are then pressed together in a press section of a papermachine to form a two-ply base layer. A further layer is attached with an adhesive to the top ply; the further layer selected from the group consisting of paper or film. The adhesive contains no pigment. In a further embodiment the method comprises adding an additional layer of paper or board to the bottom ply with a second adhesive layer.

In a further embodiment, the method of forming a laminated composite sheet comprises adding a second two ply base layer. The second two ply base layer comprised of a bottom ply and a top ply; wherein the bottom ply is comprised of unbleached cellulosic fibers and wherein said top ply is comprised of bleached or brightened cellulosic fibers. The bottom ply of the second two-ply base layer is attached to the bottom ply of the two-ply base layer with a second layer of adhesive.

In a further embodiment, the method of comprises attaching to the top ply of the second two-ply base layer with a layer of adhesive, a layer selected from the group consisting of paper or film; the adhesive containing no pigment.

It is a further object of the invention to provide a method for forming a laminated composite sheet comprising: preparing a pair of two ply base layers comprised of a bottom ply and a top ply. The top ply is comprised of bleached or brightened cellulosic fibers. The bottom ply is prepared with unbleached cellulosic fibers. The two plies are pressed together in a press section of a papermachine to form a two-ply base layer. The base layer are attached together with an adhesive. The base layers being attached by the bottom plies so that the top plies remain visible.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

Fig. 1 is a cross-sectional elevation illustrating an embodiment of the present invention referred to as interlamine board;

Fig. 2 is a cross-sectional elevation illustrating an embodiment of the present invention referred to as interlamine B-board;

Fig. 3 is a cross-sectional elevation illustrating an embodiment of the present invention referred to as dual-interlamine board;

Fig. 4 is a cross-sectional elevation illustrating an embodiment of the present invention referred to as composi-interlamine board; and

Fig. 5 is a cross-sectional elevation illustrating an embodiment of the present invention referred to as composi-board.

### **DETAILED DESCRIPTION OF THE INVENTION**

All of the embodiment of the present invention have a common component, a two-ply base layer 1. The two-ply base layer 1 is formed on a papermaking machine having two wires described herein. The top ply is made from pulp stock consisting of dyed virgin pulp, dyed recycled pulp, bleached virgin pulp or bleached recycled pulp, or

any combination thereof. The top ply is generally thinner than the bottom ply, which is comprised of unbleached virgin kraft pulp, unbleached recycled pulp or a combination thereof. Once the two-ply base layer 1 is formed and dried, it is used to create several embodiments of the present invention, namely interlamine board, interlamine B-board, composi-interlamine board, dual-interlamine board or composi board. Various embodiments of the present invention have high quality graphics and may be used to create point-of-purchase displays, disposable cups, plates and bowls, book covers, folding cartons or beverage carriers.

The paper web supported by the single felt is transferred to a first dryer section. At this point, the web of paper is strong enough to support its own weight and can continue unsupported by a felt into the dryer section. The web comes in direct contact with polished surfaces of numerous dryer rollers in the dryer section, which imparts additional smoothness and varying degrees of gloss on the web.

Figure 1 illustrates a first embodiment of the present invention, the interlamine board 10. The interlamine board 10 is comprised of three separate components: the two-ply substrate 1 made on one paper machine, a continuous layer of adhesive 12 and a layer of paper or film 14. The layer of paper or film 14 can be white or colored and can be coated or uncoated. The two ply substrate 1 has a first ply 3 and a second ply 5. The top ply 3 which is composed of dyed or bleached, virgin or recycled pulp. Bottom ply or brown ply 5 is composed of unbleached cellulosic fibers such as unbleached virgin kraft pulp or recycled pulp. The unbleached bottom ply 5 can be substantially thicker than the bleached or dyed top ply 3. The basis weight of top ply 3 is typically in the range of about 4 to 20 lbs per 1,000 sq. feet and is dependent upon the quality of the furnish, and

the degree of brightness needed to prevent the show-through of the bottom ply 5. A common grade of this base board is white-top or moddled white linerboard. The layer of adhesive 12 is applied to a surface of top ply 3. The adhesive 12 preferably has the characteristics of providing a continuous bond between the paper 14 and substrate 1 and resist delamination. Further, the adhesive 12 may be used as a barrier against the transfer of moisture, oils, odors or the like. It is important that the adhesive 12 does not impregnate either the paper 14 or top ply 3, thereby causing them to be relatively transparent. Such adhesives would defeat a purpose of the present invention because a darker bottom ply would decrease the brightness of the graphics printed on paper or film 14. Paper or film 14 is preferably a coated grade paper capable of supporting high quality graphics. The benefits of the white ply is to put a light basis weight paper or film over it. Such paper 14 may be coated in order to enhance its smoothness, and therefore printability. Such paper can be printed before the lamination process to provide higher quality and more economical printing processes (either in an in-line process that has subsequent laminating or in a separate process) or the board can be printed after the lamination process, either in-line with laminating or in a subsequent operation. Film 14 could be polyethylene or polypropylene films. Such films could provide tear resistance. Such films could have pigments to enhance brightness of the printing surface. Such films could be secured with pigmented adhesives to enhance the brightness of the printing surface. This embodiment is particularly useful for products such as cereal boxes, Kleenex boxes, beverage carriers, or any other application where the interior side of the package may be unbleached.

General Information		Study Design		Study Population		Intervention		Outcome Measures		Statistical Analysis		Results		Conclusions	
Author	Year	Design	Setting	Sample Size	Age Range	Intervention	Control	Primary Outcome	Secondary Outcome	Statistical Test	Significance	Effect Size	Conclusion	Limitations	Recommendations
Smith et al.	2015	Randomized Controlled Trial	University of Michigan	100	18-25	Intervention	Control	Primary Outcome	Secondary Outcome	Chi-square	p < 0.05	0.2	Intervention is superior	Small sample size	Further research needed
Jones et al.	2016	Quasi-experimental	St. Mary's Hospital	200	26-45	Intervention	Control	Primary Outcome	Secondary Outcome	t-test	p < 0.01	0.3	Intervention is superior	No randomization	Further research needed
Lee et al.	2017	Systematic Review	Meta-analysis	1500	18-65	Intervention	Control	Primary Outcome	Secondary Outcome	Forest Plot	p < 0.001	0.4	Intervention is superior	Heterogeneity	Further research needed
Kim et al.	2018	Randomized Controlled Trial	Seoul National University	300	18-30	Intervention	Control	Primary Outcome	Secondary Outcome	Chi-square	p < 0.05	0.2	Intervention is superior	Small sample size	Further research needed
Chen et al.	2019	Quasi-experimental	Beijing University	150	21-35	Intervention	Control	Primary Outcome	Secondary Outcome	t-test	p < 0.01	0.3	Intervention is superior	No randomization	Further research needed
Wang et al.	2020	Systematic Review	Meta-analysis	2000	18-70	Intervention	Control	Primary Outcome	Secondary Outcome	Forest Plot	p < 0.001	0.4	Intervention is superior	Heterogeneity	Further research needed
Nguyen et al.	2021	Randomized Controlled Trial	University of California	400	18-40	Intervention	Control	Primary Outcome	Secondary Outcome	Chi-square	p < 0.05	0.2	Intervention is superior	Small sample size	Further research needed
Patel et al.	2022	Quasi-experimental	Indian Institute of Technology	250	22-38	Intervention	Control	Primary Outcome	Secondary Outcome	t-test	p < 0.01	0.3	Intervention is superior	No randomization	Further research needed
Alam et al.	2023	Systematic Review	Meta-analysis	1800	18-60	Intervention	Control	Primary Outcome	Secondary Outcome	Forest Plot	p < 0.001	0.4	Intervention is superior	Heterogeneity	Further research needed
Adams et al.	2024	Randomized Controlled Trial	University of Texas	500	18-50	Intervention	Control	Primary Outcome	Secondary Outcome	Chi-square	p < 0.05	0.2	Intervention is superior	Small sample size	Further research needed
Black et al.	2025	Quasi-experimental	University of London	350	23-42	Intervention	Control	Primary Outcome	Secondary Outcome	t-test	p < 0.01	0.3	Intervention is superior	No randomization	Further research needed
Green et al.	2026	Systematic Review	Meta-analysis	2200	18-75	Intervention	Control	Primary Outcome	Secondary Outcome	Forest Plot	p < 0.001	0.4	Intervention is superior	Heterogeneity	Further research needed
White et al.	2027	Randomized Controlled Trial	University of Sydney	600	18-60	Intervention	Control	Primary Outcome	Secondary Outcome	Chi-square	p < 0.05	0.2	Intervention is superior	Small sample size	Further research needed
Brown et al.	2028	Quasi-experimental	University of Toronto	450	24-45	Intervention	Control	Primary Outcome	Secondary Outcome	t-test	p < 0.01	0.3	Intervention is superior	No randomization	Further research needed
Miller et al.	2029	Systematic Review	Meta-analysis	2500	18-80	Intervention	Control	Primary Outcome	Secondary Outcome	Forest Plot	p < 0.001	0.4	Intervention is superior	Heterogeneity	Further research needed
Wilson et al.	2030	Randomized Controlled Trial	University of Melbourne	700	18-70	Intervention	Control	Primary Outcome	Secondary Outcome	Chi-square	p < 0.05	0.2	Intervention is superior	Small sample size	Further research needed
Davis et al.	2031	Quasi-experimental	University of Edinburgh	550	25-48	Intervention	Control	Primary Outcome	Secondary Outcome	t-test	p < 0.01	0.3	Intervention is superior	No randomization	Further research needed
Evans et al.	2032	Systematic Review	Meta-analysis	2800	18-85	Intervention	Control	Primary Outcome	Secondary Outcome	Forest Plot	p < 0.001	0.4	Intervention is superior	Heterogeneity	Further research needed
Roberts et al.	2033	Randomized Controlled Trial	University of Manchester	800	18-80	Intervention	Control	Primary Outcome	Secondary Outcome	Chi-square	p < 0.05	0.2	Intervention is superior	Small sample size	Further research needed
Turner et al.	2034	Quasi-experimental	University of Bristol	650	26-50	Intervention	Control	Primary Outcome	Secondary Outcome	t-test	p < 0.01	0.3	Intervention is superior	No randomization	Further research needed
Phillips et al.	2035	Systematic Review	Meta-analysis	3000	18-90	Intervention	Control	Primary Outcome	Secondary Outcome	Forest Plot	p < 0.001	0.4	Intervention is superior	Heterogeneity	Further research needed
Carter et al.	2036	Randomized Controlled Trial	University of Glasgow	900	18-90	Intervention	Control	Primary Outcome	Secondary Outcome	Chi-square	p < 0.05	0.2	Intervention is superior	Small sample size	Further research needed
Morgan et al.	2037	Quasi-experimental	University of Liverpool	750	27-55	Intervention	Control	Primary Outcome	Secondary Outcome	t-test	p < 0.01	0.3	Intervention is superior	No randomization	Further research needed
Baker et al.	2038	Systematic Review	Meta-analysis	3200	18-95	Intervention	Control	Primary Outcome	Secondary Outcome	Forest Plot	p < 0.001	0.4	Intervention is superior	Heterogeneity	Further research needed
Nelson et al.	2039	Randomized Controlled Trial	University of Cardiff	1000	18-100	Intervention	Control	Primary Outcome	Secondary Outcome	Chi-square	p < 0.05	0.2	Intervention is superior	Small sample size	

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are resistant to such substances. Moisture oily products would likely leave spots, stains or raised patches on either surface. However, it may be desirable that at least one of the adhesive layers 12 or 32 be such that it blocks any type of odor emanating from a product contained within a package constructed from the dual-laminated board 30. This particular embodiment of the present invention is useful for paperback book covers, perfume boxes, gift boxes or any type of container or sheeting where it is desirable to have graphics, publication grade paper or generally enhanced brightness on either side, exposed on each surface.

The embodiment of the present invention shown in Figure 4 is a composi-interlamine board 40. Composi-interlamine board 40 is constructed using interlamine board 10 and two additional elements, namely adhesive layer 42 and a two-ply base layer 1. As previously described, the two ply base layer 1 is comprised of a top ply 3 and a bottom ply 5. The bottom ply 5 of base layer 1 is attached to the bottom ply 5 of the interlamine board 10 at its surface using a continuous layer of adhesive 42. Thus, at the surface 44 of bleached top ply 3 is exposed and at surface 46, the paper or film 14, with or without printed graphics, is likewise exposed. As with the dual-interlamine board 30, it is doubtful that moisture oily products will be in contact with either surface to preserve the appearance of each surface. Thus, it is not necessary for adhesives 12 and 42 to be moisture or oil resistant. However, as with the dual-interlamine board 30 it may be desirable to block odors using at least one of the layers of adhesive 12 or 42. This embodiment is particularly useful for products such as Kleenex boxes, food boxes, high end packaging for cosmetics and the like. The surface 46 would be used as the exterior of the package, and surface 44 as the interior.

[illegible]

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It is important to note that virgin pulp used to make two-ply board may be made using either a chemical or mechanical pulping process. In the chemical process, the pulp is cooked and the majority of lignin is removed from the pulp. This results in finely translucent pulp fibers. In the mechanical process, wood is ground into pulp. This process does not remove lignin so the pulp fibers are more opaque. Though this process is less expensive, paper made from such lignin-containing pulp tends to yellow with exposure to light and air. Because the top ply 3 of the two-ply base layer is covered with publication paper 14 in several of the above mentioned embodiments, yellowing of ply 3 would not be noticeable and may not occur. Thus, it is desirable to use the less expensive mechanically processed virgin pulp for the top ply 3 furnish. The outer ply can also be made from recycled fibers, such as deinked and potentially bleached fibers processed from fiber such as mixed office waste.

The composite paperboards of each embodiment are intended to be used as substitutes for existing paperboards. Thus, other processes may be applied to each of the embodiments. These include additional laminating, printing, foil stamping, dye cutting, scoring, folding, gluing and the like to create cartons, beverage carriers and other paperboard products with optional graphic images thereon. This additional processing may take place while the composite board is in a web form, or after it is cut into sheets. Additionally, a varnish or other such coating may be applied to the surface of one or both sides of the board, to add decoration or protect the surface of the board and graphic images. Typically, such varnish coatings are used to protect the surface of cartons used, particularly for items that receive an inordinate amount of potential surface wear and



abrasion. These include, beverage carriers, paperback novels, and other products that are exposed to a significant amount of handling either in shipping or in use.

2025 RELEASE UNDER E.O. 14176

## Claims

1. A laminate composite sheet comprising:  
a two-ply base layer comprised of a bottom ply and a top ply, wherein the bottom ply is comprised of unbleached cellulosic fibers and wherein the top ply is comprised of bleached or brightened cellulosic fibers;  
a further layer attached to the top ply with a layer of adhesive; said further layer having a top and a bottom surface, said further layer selected from the group consisting of paper or film; said layer of adhesive containing no pigment, and said top surface of said further layer having no coating.
2. The composite sheet of claim 1 wherein said sheet is capable of making products having high quality graphics.
3. The composite sheet of claim 1 wherein said unbleached cellulosic fibers are selected from the group consisting of unbleached virgin kraft pulp and unbleached recycled pulp.
4. The composite sheet of claim 1 wherein said bottom ply is substantially thicker than said top ply.
5. The composite sheet of claim 1 wherein the top ply has a brightness of above 60 ISO.
6. The composite sheet of claim 1 wherein the top ply has enhanced smoothness.
7. The composite sheet of claim 3 wherein the adhesive is a barrier for moisture, oil and odor.
8. The composite sheet of claim 1 wherein the paper sheet is a publication grade paper.

9. The composite sheet of claim 1 wherein the paper sheet is a lable stock grade.
10. The composite sheet of claim 9 wherein the paper sheet has a coating.
11. The composite sheet of claim 10 wherein the coating is selected from the group consisting of clay and protein and/or starch or Titanium Dioxide
12. The composite sheet of claim 1 wherein said film is a tear resistant film.
13. The composite sheet of claim 1 wherein said film is reverse printed.
14. The composite sheet of claim 1 wherein said film contains a pigment.
15. The composite sheet of claim 1 further including an additional layer of paper or board attached to said bottom ply with a second adhesive layer.
16. The composite sheet of claim 15 wherein said additional layer is comprised of unbleached cellulosic fibers selected from the group consisting of unbleached virgin kraft pulp and unbleached recycled pulp.
17. The composite sheet of claim 15 wherein said additional layer is a moisture absorbent layer.
18. The composite sheet of claim 17 wherein the second adhesive layer is not significantly absorbed by the moisture absorbent layer, and the second adhesive layer acts as a moisture barrier.
19. The composite sheet of claim 15 wherein said second adhesive layer is selected from the group consisting of hot melt glues or glues that are moisture and/or oil resistant.
- 20/ A laminated composite sheet comprising:  
a pair of two-ply base layers, comprised of a bottom ply and a top ply,  
wherein the bottom ply is comprised of unbleached cellulosic fibers and wherein  
the top ply is comprised of bleached or brightened cellulosic fibers; and

an adhesive layer is disposed between the base layers, serving to adhere the bottom plies of each base layer together so that the top plies remain visible.

21. The composite sheet of claim 20 wherein said sheet is used to make products having high quality graphics.
22. The composite sheet of claim 1 further comprising a second two-ply base layer comprised of a bottom ply and a top ply, wherein the bottom ply is comprised of unbleached cellulosic fibers and wherein the top ply is comprised of bleached or brightened cellulosic fibers;
- said bottom ply of said second two-ply base layer attached to the bottom ply of said two-ply base layer with a second layer of adhesive.
- 23 The composite sheet of claim 22 further comprising a layer attached to the top ply of said second two ply base layer with a layer of adhesive; said layer having a top and a bottom surface, said layer selected from the group consisting of paper or film; said layer of adhesive containing no pigment, and said top surface of said layer having no coating.
- 24 / A method for forming a laminated composite sheet comprising:
- preparing a top ply comprised of bleached or brightened cellulosic fibers;
- preparing a bottom ply comprised of unbleached cellulosic fibers;
- pressing together in a press section of a papermachine said top ply and said bottom ply to form a two-ply base layer;
- attaching a further layer with an adhesive to said top ply; said further layer selected from the group consisting of paper or film; said adhesive containing no pigment.'

25. The method of claim 24 further comprising:  
adding an additional layer of paper or board to said bottom ply with a second adhesive layer.
26. The method of claim 24 further comprising:  
adding a second two ply base layer: comprised of a bottom ply and a top ply;  
wherein the bottom ply is comprised of unbleached cellulosic fibers and wherein said top ply is comprised of bleached or brightened cellulosic fibers;  
attaching said bottom ply of said second two-ply base layer to said bottom ply of said two-ply base layer with a second layer of adhesive.
27. The method of claim 26 further comprising:  
attaching to said top ply of said second two-ply base layer with a layer of adhesive, a layer selected from the group consisting of paper or film; said adhesive containing no pigment.
28. A method for forming a laminated composite sheet comprising:  
preparing a pair of two ply base layers comprised of a bottom ply and a top ply;  
preparing said top ply comprised of bleached or brightened cellulosic fibers  
preparing a bottom ply comprised of unbleached cellulosic fibers;  
pressing together in a press section of a papermachine said top ply and said bottom ply to form a two-ply base layer;  
attaching said base layers together with an adhesive;  
said base layers being attached by said bottom plies so that the top plies remain visible.

## ABSTRACT

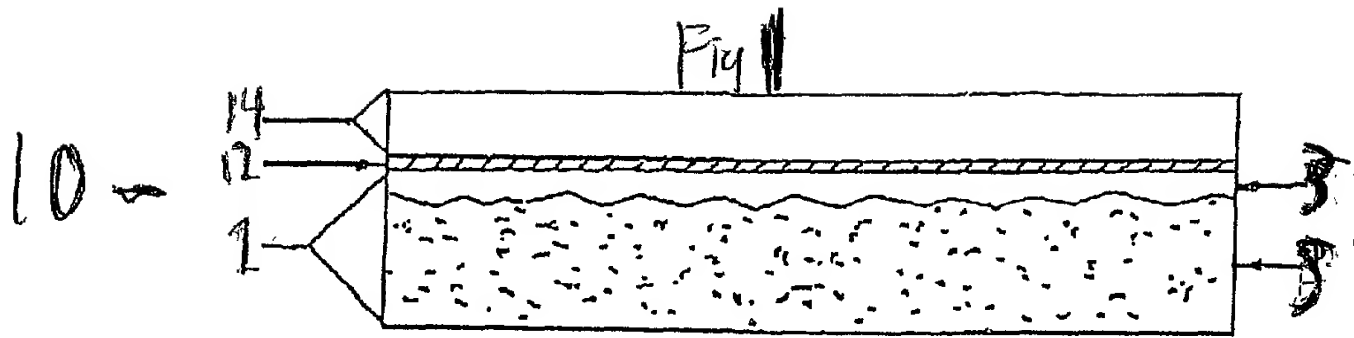
This application is a continuation-in-part of Serial No. 08/579,219 filed December 28, 1995, incorporated herein by reference.

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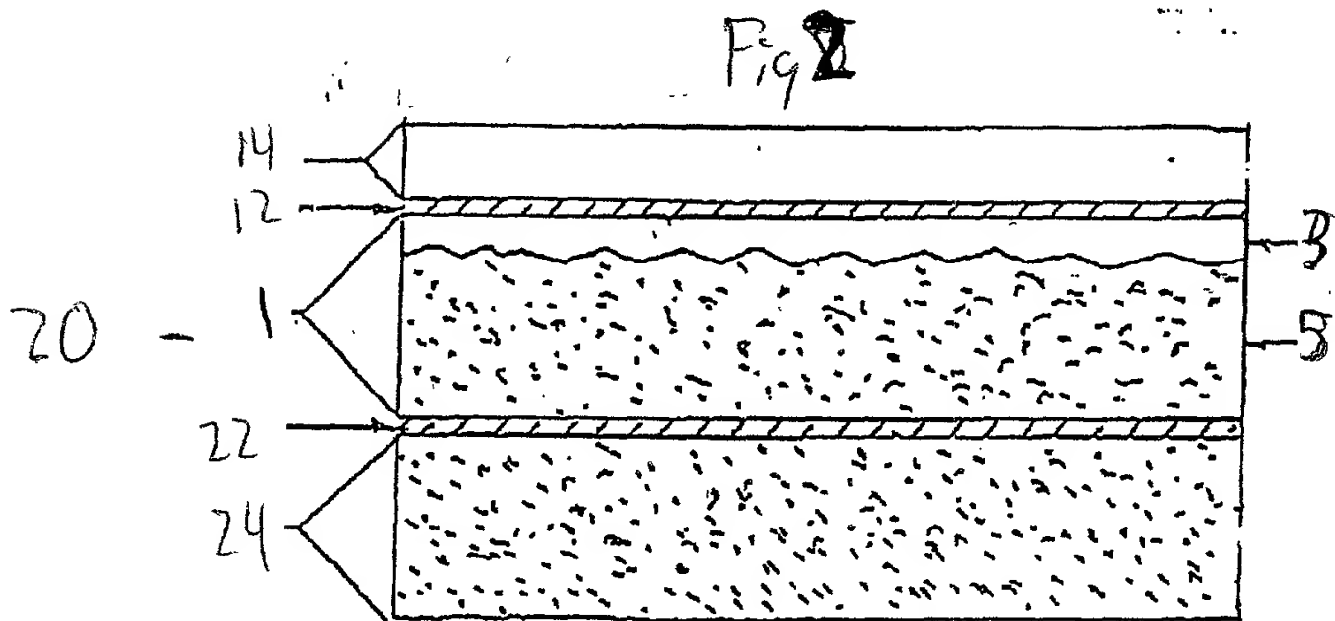
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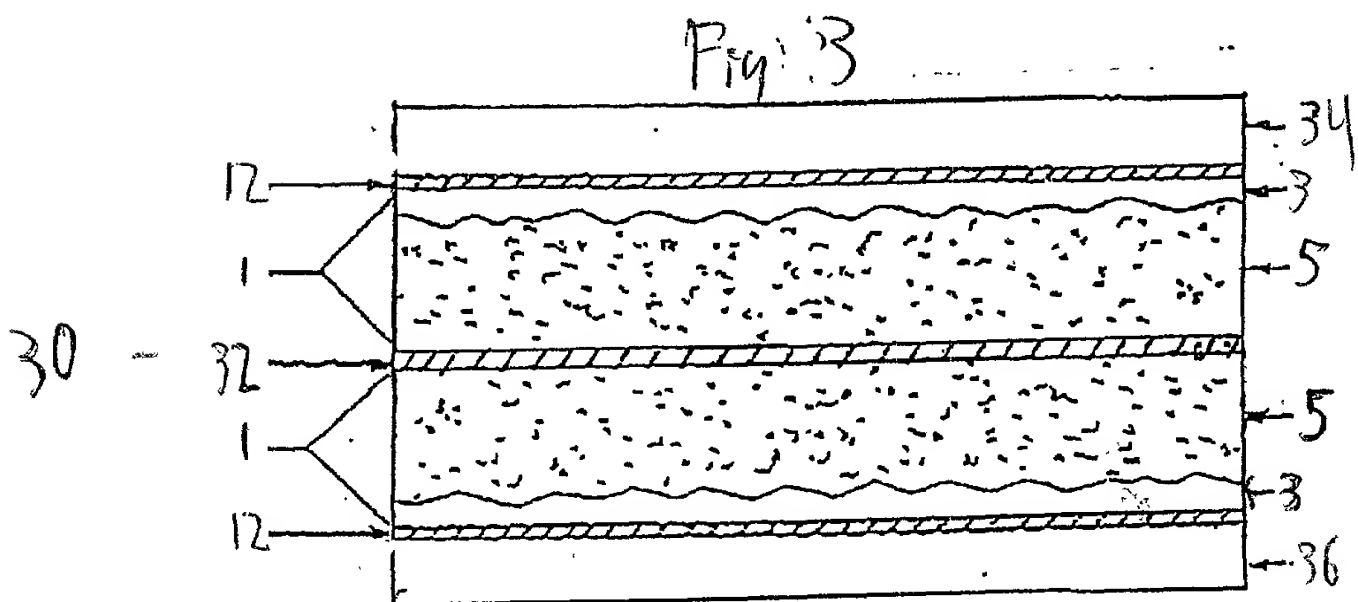
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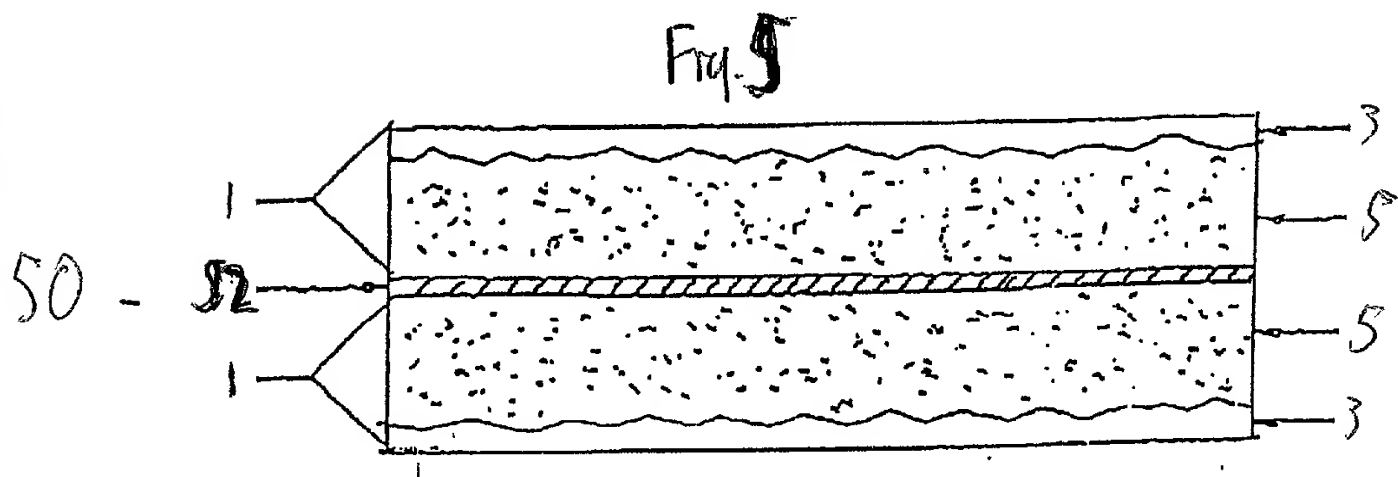
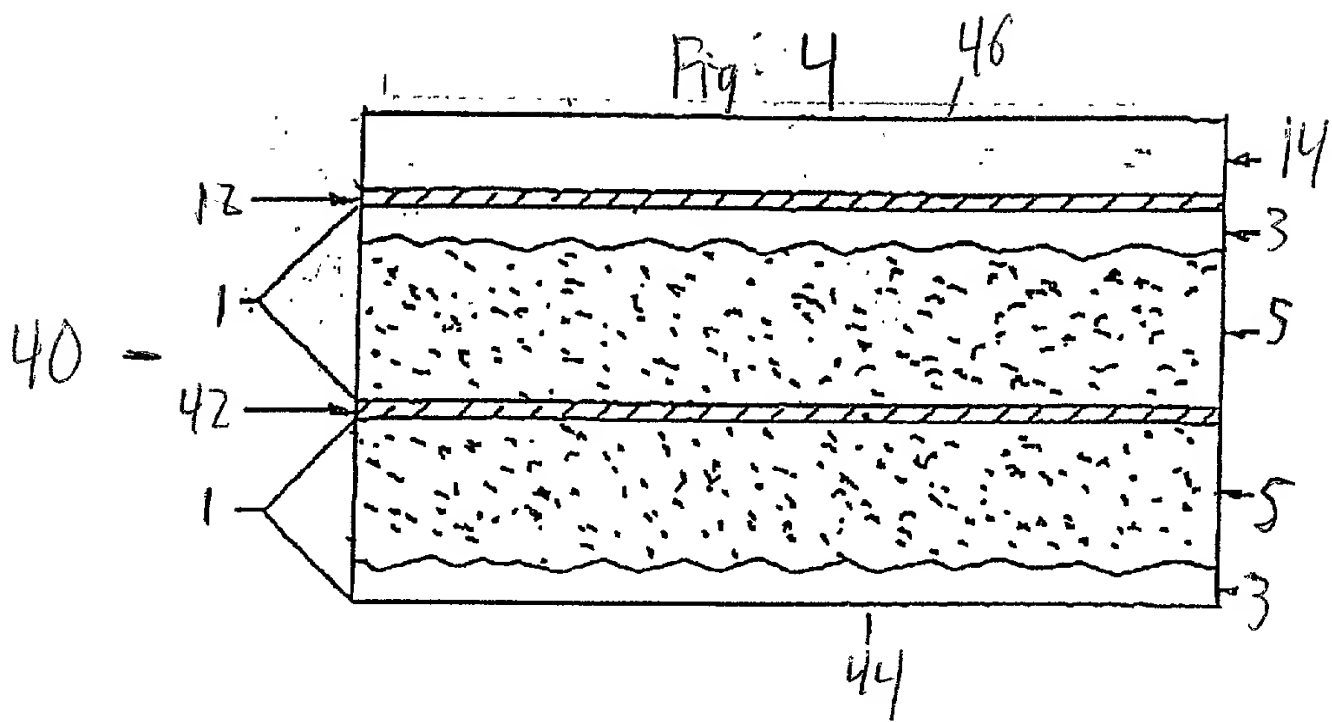


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	<b>First Named Inventor</b>	Roger P. Hoffman
	<b>COMPLETE IF KNOWN</b>	
	<b>Application Number</b>	/
	<b>Filing Date</b>	
	<b>Group Art Unit</b>	
	<b>Examiner Name</b>	

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**COMPOSITE PAPERBOARDS AND METHOD OF MAKING COMPOSITE PAPERBOARDS**

the specification of which  
☒ is attached hereto  
OR  
☐ was filed on (MM/DD/YYYY) [ ] as United States Application Number or PCT International Application Number [ ] and was amended on (MM/DD/YYYY) [ ] (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or of any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
				YES	NO
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☐ Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto:

I hereby claim the benefit under 35 U.S.C. 119(e) of any United States provisional application(s) listed below.

Application Number(s)	Filing Date (MM/DD/YYYY)	<input type="checkbox"/> Additional provisional application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.
60/122,556	3/2/1999	

[Page 1 of 2]

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I hereby claim the benefit under 35 U.S.C. 120 of my United States application(s), or 366(a) of any PCT international application designating the United States of America, filed below and, insofar as the subject matter of such of the claims of this application is not disclosed in the prior United States or PCT international application in the manner provided by the first paragraph of 35 U.S.C. 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

U.S. Parent Application or PCT Parent Number	Parent Filing Date (MM/DD/YYYY)	Parent Patent Number (if applicable)

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Name	Registration Number	Name	Registration Number
Philip M. Weiss	34,751		

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Country	USA	Telephone	516-739-15900	Fax	516-739-2189

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements were made with the knowledge that willful false statements and the use of false information are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Name of Sole or First Inventor: ☐ A petition has been filed for this unsigned inventor

Given Name (first and middle if any)	Family Name or Surname
Roger P.	Hoffman

Inventor's Signature		Date	7/24/00
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Residence City	Green Bay	State	WI	Country	USA	Citizenship	US
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☐ Additional inventors are being named on the \_\_\_\_\_ supplemental Additional Inventor(s) sheet(s) PTO/GB/024 attached hereto.